CLAIMS:

1. A method of calibrating a transmitting part of a node in a wireless communication network, which communication network comprises at least a first radio node and a second radio node which can be arranged to be in radio communication with each other, said calibration method **characterised in** that the calibration is based on at least one representation of radio channel characteristics, which at least one representation has been exchanged from one radio node to the other.

2. Calibration method according to claim 1, **wherein** said calibration method comprises the steps of:
-*transmitting* (305) channel estimation symbols, or pilots, from at least the second radio node to the first radio node over a radio channel;
-*calculating* (310) at least one representation of the radio channel characteristics in at least the second radio node;
-*exchanging* (315) at least one representation of the radio channel characteristics from one of the radio nodes to the other radio node;
-*compensating* (325) radio transmissions from the first radio node with at least one correction factor which is at least partly based on the exchanged representation of the radio channel characteristics, whereby achieving essentially reciprocity between the radio channel from the first radio node to the second radio node and the radio channel from the second radio node to the first radio node.

3. Calibration method according to claim 2, **wherein** the calibration method is initiated in predetermine time intervals.

4. Calibration method according to claim 2, **wherein** the calibration method is initiated as a response of a measure of communication quality being below a predetermined threshold value.

5. Calibration method according to any of claims 2 to 4, **wherein**:
-in the transmitting step (305, 405) pilot signals are send both from the first radio node to the second radio node and from the second radio node to the first radio node;
-in the calculating step (310, 410) a first estimate, $\hat{H}_{A\rightarrow B}$, for the channel from the first radio node to the second radio node is calculated in the second radio node, and a second estimate $\hat{H}_{B\rightarrow A}$ for the channel from the second radio node to the first radio node is calculated in the first radio node;

-in the exchanging step (315, 415) a representation of the first channel estimate is transmitted from the second radio node to the first radio node.

6. Calibration method according to any of claims 2 or 4, **wherein**:
-in the transmitting step (305, 505) pilot signals are send from the second radio node to the first radio node;
-in the calculating step (310, 510) an estimate $\hat{H}_{B\to A}$ for the channel from the second radio node to the first radio node is calculated in the first radio node; and the calibration method comprises further steps of:
-*calculating* a preliminary correction factor, h_{AB}, (511) based on the channel estimate, $\hat{H}_{B\to A}$, in the first radio node;
-*compensating* (512) transmissions from the first radio node to the second radio node with the preliminary correction factor h_{AB};
-*estimating* (513) in the second radio node errors in the transmissions from the first radio node , and calculating a correction term, h_{corr}, from the estimated errors; and wherein:
-in the exchanging step (315, 515) the correction term is transmitted from the second radio node to the first radio node;
-in the compensating step (325, 525) the radio transmissions from the first radio node are compensated with a correction factor which has been updated with the correction term h_{corr}.

7. Calibration method according to any of claims 3 or 4, **wherein** at least the first radio node is provided with a plurality of antennas, and:
-in the transmitting step (305, 605) pilot signals a first form are send both from the first radio node to the second radio node and from the second radio node to the first radio node;
-in the calculating step (310, 610) a first estimate, $\hat{H}_{A\to B}$, for the channel from the first radio node to the second radio node is calculated in the second radio node, and a second estimate $\hat{H}_{B\to A}$ for the channel from the second radio node to the first radio node is calculated in the first radio node; and the calibration method comprises further steps of:
-*transmitting* (611) pilot signals of a second form from each of the antenna of the first radio node to the second radio node;
-*estimating* transmission errors (612) in the second radio node, said estimation based on the received pilot signals in the first and second form, and calculating a correction

vector with correction terms for respective antenna of the first radio node; and wherein:

-in the exchanging step (615, 515) the correction vector is transmitted from the second radio node to the first radio node; and

-in the compensating step (325, 525) the radio transmissions from the first radio node are compensated with a correction factor for each antenna, which correction factors are based at least partly on the respective correction terms in the correction vector.

8. Calibration method according to claim 1, **wherein** said calibration method comprises the steps of:

-*transmitting* (405) channel estimation symbols, or pilots, from the first radio node to at least the second radio node and from the second radio node to at least the first radio node;

-*estimating* (410), in the second radio node, the radio channel from the first radio node to the second radio node $\hat{H}_{A\to B}$, and, in the first radio node, the radio channel from the second radio node to the first radio node $\hat{H}_{B\to A}$;

-*exchanging* information between stations (415), wherein the second radio node sends a representation of the channel estimate $\hat{H}_{A\to B}$ to the first radio node;

-*calculating* (420) a channel correction factor, H_{Corr}, according to:

$$H_{Corr} = \frac{\hat{H}_{B\to A}}{\hat{H}_{A\to B}} = \frac{\hat{H}_{B,TX}\cdot\hat{H}_{CH}\cdot\hat{H}_{A,RX}}{\hat{H}_{A,TX}\cdot\hat{H}_{CH}\cdot\hat{H}_{B,RX}} = \frac{\hat{H}_{B,TX}\cdot\hat{H}_{A,RX}}{\hat{H}_{A,TX}\cdot\hat{H}_{B,RX}}$$

-*compensating* (325) transmissions from the first radio node to at least the second radio node with the channel correction factor, H_{Corr}.

9. Calibration method according to claim 1, **wherein** at least the first radio node is provided with a plurality of antennas, and said calibration method comprises the steps of:

-*transmitting* (705) first channel estimation symbols, or first pilots ,*P*, from the first radio node to at least the second radio node and from the second radio node to at least the first radio node;

-*estimating* (710), in the second radio node, the radio channel from the first radio node to the second radio node $\hat{H}_{A\to B}$, and, in the first radio node, the radio channel from the second radio node to the first radio node $\hat{H}_{B\to A}$;

-calculating (711) , in the first radio node, a pre-filter, $H^*_{B\to A}$.

-transmitting (712) from the first radio node to the second radio node second channel estimation symbols, or second pilots, P_d , multiplied with the pre-filter, $H^*_{B\to A}$, which as the second radio node will be received as

$$R_s = H_{A\to B} \cdot H^*_{B\to A} \cdot P_d;$$

-estimating (713), in the second radio node, a correction vector from $H^*_{B\to A}$ and $H_{A\to B}$, wherein $H_{A\to B}$ are known by the second radio node from the first pilot and $H^*_{B\to A}$ is estimated from R_s;

-exchanging information between stations (715), wherein the second radio node sends a representation of the correction vector to the first radio node;

-calculating (720), in the first radio node, channel correction factors for each antenna based on the correction vector;

-compensating (725) transmissions from the first radio node to at least the second radio node with the channel correction factors, whereby ensuring reciprocity.

10. Calibration method according to claim 1, **wherein** at least the first radio node is provided with a plurality of antennas, and said calibration method comprises the steps of:

-transmitting (605) first channel estimation symbols, or first pilots ,P, from the first radio node to at least the second radio node and from the second radio node to at least the first radio node;

-estimating (610), in the second radio node, the radio channel from the first radio node to the second radio node $\hat{H}_{A\to B}$, and, in the first radio node, the radio channel from the second radio node to the first radio node $\hat{H}_{B\to A}$;

-transmitting (611) from the first radio node to the second radio node second channel estimation symbols, or second pilots, P_s , pre-multiplied according to:

$P_s \cdot H^*_{B\to A} \cdot \mathbf{1}_{n_B}$, which at the second radio node will be received as R_s;

-estimating (612), in the second radio node, a correction vector comprising errors for each of the first radio node's antennas based on R_s and $H_{A\to B}$;

-exchanging information between radio nodes (615), wherein the second radio node sends a representation of the correction vector to the first radio node;

-calculating (620), in the first radio node, channel correction factors for each antenna based on the correction vector;

-*compensating* (625) transmissions from the first radio node to at least the second radio node with the channel correction factors, whereby ensuring reciprocity.

11. Calibration method according to any of claims 6 to 10, **wherein** the correction vector comprises representation of either delay-errors, phase-errors or amplitude-errors, or a combination of these errors.

12. Calibration method according to any of claims 1 to 11, **wherein** a first part of the step of transmitting channel estimation symbols is performed in a first transmit time slot TX_1, wherein the second radio node transmit a pilot, P_C, which is received by the first radio node, which is in a receive mode; and
a second part of the step of transmitting channel estimation symbols is performed in a second transmit time slot TX_2, wherein the first radio node transmit a pilot, P_C, P_d or P_S which is received by the second radio node, which is in a receive mode.

13. Calibration method according to claim 12, **wherein** the step of exchanging information between radio nodes is performed in a third transmit timeslot TX_3, wherein the second radio node is in regular transmit mode and transmits information on the radio channel to the first radio node, which is in receive mode.

14. Calibration method according to claim 13, **wherein** the first radio node estimates the radio channel from the second radio channel to the first radio node, $H_{B \to A}$, in the first transmit time slot TX_1.

15. Calibration method according to claim 13 or 14, **wherein** the second radio node estimates the radio channel from the first radio channel to the second radio node, $H_{A \to B}$ in the second transmit time slot TX_2.

16. Calibration method according to claim 15, **wherein** the second radio node further estimates a correction vector or correction term in the second transmit time slot TX_2.

17. Calibration method according to any of claims 13 to 16, **wherein** the step of calculating correction factor or factors in the first radio node is performed in the third transmit timeslot TX_3.

18. Computer program products directly loadable into the internal memory of a processing means within a radio node, comprising the software code means adapted for controlling the steps of any of the claims 1 to 17.

19. Computer program products stored on a computer usable medium, comprising readable program adapted for causing a processing means in a processing unit within a sender and receiver, to control an execution of the steps of any of the claims 1 to 17.

20. A communication system (800) for wireless communication, the system comprising at least a first radio node and a second radio node which can be arranged to be in radio communication with each other, said communication system **characterised in** that the at least the first radio node is calibrated with the aid of the second radio node by the use of the calibration method according to any of claims 1 to 17.

21. The communication system according to claim 20, **wherein** the at least one of the radio nodes of the system utilizes a multiantenna configuration such as MIMO.

22. A radio node adapted for wireless communication in a wireless network (800), which network comprises at least a second radio node, **characterised in** that the first radio node comprises:
-exchanging means (232) for receiving at least one representation of a first radio channel estimates;
-channel estimating means (224) for producing a second radio channel estimate from a radio signal received by the first radio node;
-calculating means (226) for calculating a correction vector/term or a representation of a radio channel estimates based on the received first radio channel estimate and the second radio channel estimate; and
-compensating means (234) for compensating radio transmissions from the first radio node with at least one correction factor which is at least partly based on the calculated calibration, and adapted to achieve essentially reciprocity between the radio channel from the first radio node to the second radio node and the radio channel from the second radio node to the first radio node.

23. The radio node according to claim 22, **wherein** the first radio node further comprises:

-pilot transmitting means (228) for controlling the transmission of channel estimation symbols to at least the second radio node over a radio channel.

24. The radio node according to claims 22 or 23, **wherein** the radio node further comprises means for initiating a calibration process, said initiating means adapted to initiate the calibration process in predetermine time intervals.

25. The radio node according to claims 22 or 23, **wherein** the radio node further comprises means for initiating a calibration process, said initiating means adapted to initiate the calibration process as a response of a measure of communication quality being below a predetermined threshold value.

26. The radio node according to any of claims 23 to 25, **wherein**
-the transmitting means is adapted to transmit a pilot signals at least to the second radio node;
-the calculating means are adapted to calculate an estimate $\hat{H}_{B\to A}$ for the channel from the second radio node to the first radio node, and to calculate a preliminary correction factor, h_{AB}, based on the channel estimate, $\hat{H}_{B\to A}$;
-the compensating means is adapted to compensate transmissions from the first radio node to at least the second radio node with the preliminary correction factor h_{AB};
-the exchanging means is adapted for receiving a correction term, h_{corr}, which has been calculated based on estimations of errors in an transmissions from the first radio node using the preliminary correction factor h_{AB};
-the compensating means is further adapted to compensate radio transmissions from the first radio node with a correction factor which has been updated with the correction term h_{corr}.

27. The radio node according to any of claims 22 to 26, **wherein** the radio node utilizes a multiantenna configuration such as MIMO.

28. The radio node according to any of claims 22 to 26, **wherein**, the radio node is a mobile station (815).

29. The radio node according to any of claims 22 to 26, **wherein** the radio node is a radio base station (805).

30. The radio node according to any of claims 22 to 26, **wherein** the radio node is a relay station (810).